Colonoscopy screening for colon polyps: Can it be useful at an earlier age for preventing malignant transformation?

Colonoscopy screening for colon polyps

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Abstract

Aim: The aim of this study was to investigate whether colonoscopy screening should be performed at an earlier age than specified in the current guidelines. Material and Methods: Data of 1882 patients who presented to the gastroenterology clinic of our hospital and underwent colonoscopy were retrospectively evaluated. Polyps detected during colonoscopy were excised and sent to the pathology laboratory for histopathological examination. Patients were divided into two groups as <45 years old and ≥45 years old, and the data were compared between the groups.
Results: The most common indications for colonoscopy were abdominal pain in 40.6% of the patients, rectal bleeding in 18.6%, constipation in 14.2%, anemia in 10.5%, diarrhea in 3.1%, and other reasons in 6.8%. The rate of polyps was statistically significantly higher in patients aged ≥45 years (43.3%) compared to patients aged <45 years (32.1%). The rate of neoplastic polyps was statistically significantly higher in the group aged ≥45 years compared to the group aged <45 years. The most common localizations of polyps were rectum and sigmoid colon in all age groups.
Discussion: Based on our findings, we believe that the onset age of screening for colon polyps should be 45 years, as recommended by the updated guidelines. Also, colonoscopy screening should be performed in young adults without alarm symptoms who present with lower gastrointestinal complaints.

Keywords

Colon Polyps; Colonoscopy; Neoplastic; Hyperplastic; Age

Introduction

Colon polyps are considered a bridge to colorectal cancer (CRC) because of their potential for malignant transformation. Early detection and endoscopic removal are essential in the prevention of CRC. CRC is one of the most common cancer types in Western countries, with 446.000 new cases reported in Europe annually. The annual mortality from CRC is 214,000 for both sexes (available at: https://ecis.jrc.ec.europa.eu/). CRC cases are estimated to reach 1.36 million in men and 1.08 million in women worldwide by 2035 [1]. Recently, a change has been found in the incidence of polyps with increasing localization in the proximal colon in Western countries, accompanied by an increased number of sessile serrated polyps (SSP).

Most polyps are asymptomatic and remain unrecognized, but major clinical presentations in symptomatic cases include gastrointestinal bleeding, abdominal pain, intestinal obstruction, rectal prolapsus, and changes in bowel habits [2]. Polyps are histologically classified as neoplastic and non-neoplastic [3]. Non-neoplastic colon polyps may be inflammatory hyperplastic and cystic polyps, whereas neoplastic polyps can be benign such as tubular and tubulovillous adenomas or malignancies, and these polyps are precursors of colon cancers. Recent studies have shown that hyperplastic polyps at the right side of the intestines may have malignant potential and should be closely followed up [4]. These polyps have adenomatous components; they show a serrated, sawtooth-like surface epithelium and have BRAF mutations [5].

Colon polyps are curable if excised. If left untreated, patients may develop complications such as bleeding, and the condition may be fatal because of malignant transformation. Styrker et al. suggested that the risk of developing cancer because of sporadic colon polyps of 1 cm is 8% in 10 years and 24% in 20 years [6]. Therefore, removal of polyps is important to avoid the development of malignant polyps [7]. Interestingly, recent studies have reported an increase in the incidence of CRC in people younger than 40 years [8].

Colonoscopy is considered the best screening modality for colon cancer and adenomatous polyps by most gastroenterologists [9]. Current guidelines recommend that colonoscopy screening begin at 50 years of age and should continue until 75 years (available at: https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/colorectal-cancer-screening). Given the benefits of colonoscopy screening in adults and the increasing incidence of CRC in younger ages, there is a debate in the literature about whether colonoscopy screening for CRC should be started at an earlier age [10]. However, there is no empirical data on the effects of colonoscopy performed in patients <45 years of age.

The aim of this study was to investigate whether colonoscopy screening should be performed at an earlier age than specified in the guidelines.

Material and Methods

Study Design

The data of patients who presented to the gastroenterology clinic of our hospital due to various reasons, who had a positive stool screening test, and underwent colonoscopy from 2017 to 2019, were obtained from the hospital records and retrospectively evaluated. Patients with a severe cardiac or hepatic condition, respiratory failure, hemodynamic instability and serious systemic diseases, those at an advanced stage of disease, patients with active gastrointestinal bleeding, and those with known colorectal cancer were excluded from the study.

Data Collection

Patient demographics such as age and sex, smoking and alcohol consumption status, presence of alarm symptoms (weight loss, anemia, etc.), and family history were recorded. Besides, indications for colonoscopy, bowel cleanliness, pathologic findings, presence of polyps, localizations of polyps, type, number, and size of polyps, and presence of dysplasia were recorded and analyzed.

Data Analysis

The data obtained were analyzed in detail. Colonoscopy procedures were performed by three experienced gastroenterologists. All polyps detected during colonoscopy were excised and sent to the pathology laboratory for histopathological examination. Polyp specimens were fixed in buffered formalin. Following staining with hematoxylin eosin, one or two sections of 4 μm were examined depending on the polyp size.

The patients were divided into two groups as <45 years old and ≥45 years old and data were compared between these two groups.

Ethical Considerations

Before the study, ethical approval was received from the local ethics committee of the Sakarya University Training & Research Hospital dated 07/10/2020 and 71522473/050.01.04/402 numbered decision. The study was conducted in line with the ethical principles of the Declaration of Helsinki.

Statistical Analysis

Statistical analysis was performed using the MedCalc Statistical Software version 12.7.7 (MedCalc Software bvba, Ostend, Belgium; http://www.melcalc.org; 2013). Continuous variables were expressed as descriptive statistics (mean and standard deviation). Categorical variables were evaluated using the Chi-Squared test and Fisher's Exact test when necessary, and were expressed as frequency (n) and percentage (%). $P<0.05$ values were considered statistically significant.

Results

Demographic Data

A total of 1882 patients who underwent colonoscopy due to various reasons in the gastroenterology clinic of our hospital from 2017 to 2019 were included in the study; of all patients, 990 (52.6%) were male and 892 (47.4%) were female. The demographic data of groups are shown in Table 1. No significant difference was found between the groups in terms of age or sex (p>0.05).

The rate of smoking was found to be 13.9% in the group aged ≥45 years and 15% in the group aged <45 years. The rate of alcohol consumption was found to be 2.5% in the group aged ≥45 years and 3.9% in the group aged <45 years.
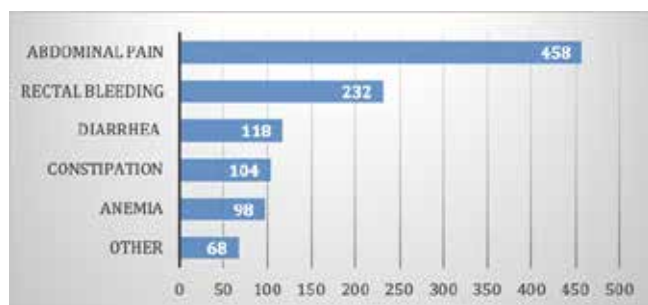
Colonoscopy Data

When data about colonoscopy procedures were examined, a family history was found in 124 (6.6%) patients and 1870

(99.4%) patients underwent their first colonoscopy. Table 2 shows bowel cleanness status, family history, number of colonoscopies, and whether colonoscopy was completed for both groups.

The most common indications for colonoscopy were abdominal pain in 40.6% of the patients (n=764), rectal bleeding in 18.6% (n=350), constipation in 14.2% (n=268), anemia in 10.5% (n=198), diarrhea in 3.1% (n=58), and other reasons in 6.8% (n=128). The distributions of colonoscopy indications according to the groups are shown in Figures 1 and 2.
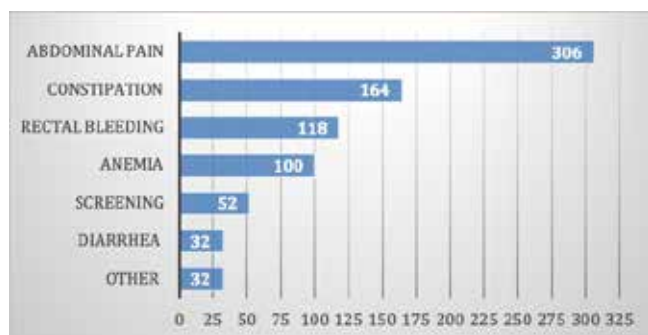
Figure 1. Colonoscopy indications in ≥ 45 yo patients

Figure 2. Colonoscopy indications in < 45 yo patients
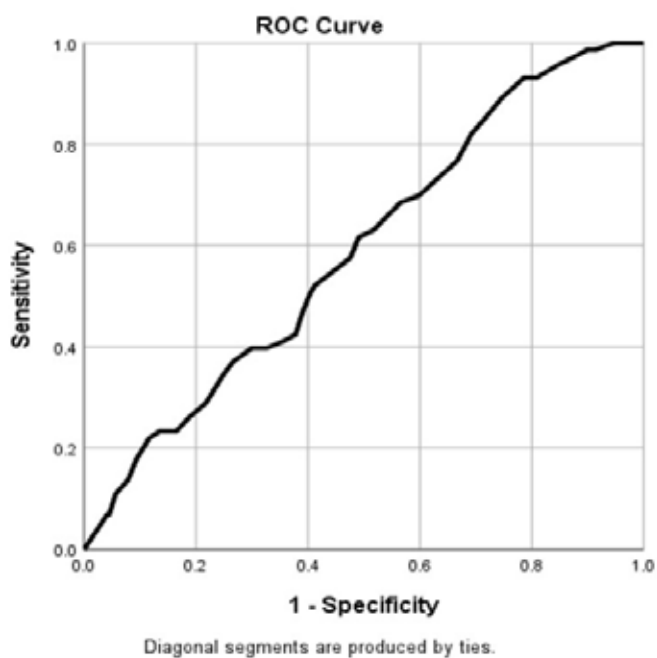
Figure 3. ROC analysis was performed to determine age cut-off that creates a risk for a high number of polyps.

Colonoscopy Findings

Colonoscopy examination was normal in 834 patients (44.3%), while pathologic findings were found in 1048 (55.7%). When all patients were evaluated, the most common pathologic findings were polyps (36.9%) and hemorrhoids (9.9%). The distribution of pathologic findings for both groups is presented in Table 3.

Localization of pathologic findings was in the rectum in 370 patients (19.6%), in the sigmoid colon in 216 (11.5%), in the descending colon in 136 (7.2%), in the transverse colon in 114 (6.1%), in the ascending colon in 104 (5.5%), and in the cecum in 62 (3.3%). Pathologic findings were observed in rectum in 19.2%, in the sigmoid colon in 16.4%, and in the descending colon in 10.2% of patients aged ≥45 years. Localization of pathologic findings was in rectum in 20% and sigmoid colon in 7.8% of patients aged <45 years.

Colonic polyps were found in 36.9% of all patients included in this study. The rate of polyps was statistically significantly higher in patients aged ≥45 years (43.3%) compared to patients aged <45 years (32.1%) (p<0.001).

Regarding the types of polyps detected during colonoscopy, in the group aged ≥45 years, neoplastic polyps were found in 178 patients, and non-neoplastic polyps were found in 170. In the group aged <45 years, neoplastic polyps were found in 114 patients, and hyperplastic polyps were found in 232. The rate of neoplastic polyps was statistically significantly higher in the group aged ≥45 years compared to the group aged <45 years (p<0.001). No statistically significant difference was found between the two groups in the incidence of non-neoplastic polyps (p=0.309).

Regarding the localizations of hyperplastic polyps, the most common polyp localizations were the rectum and sigmoid colon in all age groups. In patients under 45 years of age, we observed 6 tubular polyps in the rectum and sigmoid colon and 16 high-grade dysplasia polyps and 1 colon cancer in the ascending colon. In patients over 45 years of age, we found 34 high-grade dysplasia polyps and 2 colon cancers. The rate of having more than 3 polyps was found as 24.9% in patients aged ≥45 years and 18.1% in patients aged <45 years. The difference between the groups was statistically significant (p=0.002).

There was a statistically significant difference between patients aged ≥45 years and <45 years in the number of polyps found by three examiners. Accordingly, the number of polyps found by the first examiner was significantly higher compared to the second and third examiners (p<0.001). There was a statistical significance in the numbers of neoplastic and hyperplastic polyps found by the three examiners. The rate of detection of neoplastic and hyperplastic polyps was statistically significantly higher in the first examiner compared to the other examiners (p<0.001 for all). Colonoscopy durations were evaluated by an independent nurse and the mean colonoscopy duration was found to be longer in the first examiner compared to the other examiners.

The numbers of polyps were evaluated according to the demographic data of the patients. No statistically significant difference was found between the sexes in the number of polyps (p=0.088). Also, no significant difference was found in polyp numbers according to smoking or alcohol use (p=0.874 and p=0.488, respectively). Similarly, there was no significant

difference in polyp numbers according to family history (p=0.222). Again, no significant difference was found between patients with and without alarm symptoms in terms of polyp numbers (p=0.306).

According to the results of the ROC analysis performed to determine the critical age that can pose a risk for the number of polyps, a cut-off value of 29.5 years was found to create a risk for a high number of polyps with a sensitivity of 98.6% and a specificity of 91.4% (AUC=0.590, p=0.018) (Figure 3).

Table 1. Demographic and Clinical Features of the Groups

Demographic Features	< 45 yo n=1078	≥ 45 yo n=804	All patients n=1882
Gender n (%)			
Female	460 (42.7)	432 (53.7)	892 (52.6)
Male	618 (57.3)	372 (46.3)	990 (47.4)
Mean age (mean±SD)	34.5+5.8	54.7+6.5	43.1+11.7
Smoking n (%)			
Yes	162 (15)	112 (13.9)	274 (14.6)
No	916 (85)	692 (86.1)	1608 (85.4)
Alcohol			
Yes	42 (3.9)	20 (2.5)	62 (3.3)
No	1036 (96.1)	784 (97.5)	1820 (96.7)
Family History			
Yes	62 (5.8)	62 (7.7)	124 (6.6)
No	1016 (94.2)	742 (92.3)	1758 (93.4)
Polyp localization			
Rectum	216 (20)	144 (19.2)	370 (19.6)
Sigmoid colon	84 (7.8)	132 (16.4)	216 (11.5)
Colonoscopy indications			
Anemia	98 (9.1)	100 (12.4)	198 (10.5)
Abdominal pain	458 (42.5)	306 (38.1)	764 (40.5)
Pathological finding in colonoscopy			
Normal	482 (44.7)	352 (43.8)	834 (44.3)
Polyps	346 (32.1)	348 (43.3)	694 (36.9)
Polyp types			
Neoplastic	114 (10.6)	178 (22.1)	292 (15.5)
Non-neoplastic	232 (21.5)	170 (21.1)	402 (21.3)

Table 2. Colonoscopy data in ≥ 45 yo and < 45 yo patients

N(%)	< 45 N=1078	≥ 45 N=804	All Patients N=1882
Colon cleanness			
Mild unclean	4 (0.4)	20 (2.5)	24 (1.3)
Unclean	8 (0.7)	18 (2.2)	26 (1.4)
Suboptimal	2 (0.2)	2 (0.2)	4 (0.2)
Clean	1064 (98.7)	764 (95)	1828 (97.1)
Family history			
Yes	62 (5.8)	62 (7.7)	128 (6.6)
No	1016 (94.2)	742 (92.3)	1758 (93.4)
Number of colonoscopies			
1	1068 (99.1)	802 (99.8)	1870 (99.4)
2	8 (0.7)	2(0.2)	10 (0.5)
3	2 (0.2)	0	2 (0.1)
Colonoscopy completed			
Yes	1078 (100)	804 (100)	1882 (100)

Table 3. Pathologic findings in ≥ 45 yo and < 45 yo patients

Pathologic findings	< 45		≥ 45	
	N	%	N	%
Anal fissure	30	2.8	6	0.7
Crohn	86	8.0	18	2.2
Crohn + polyp	14	0.7	10	1.2
Diverticular disease	2	0.2	8	1.0
Hemorrhoid	90	8.3	58	7.2
Hemorrhoid + polyp	24	2.2	14	1.7
Mass	0	0	2	0.2
Colon cancer	1	0.2	2	0.2
Polyp	346	32.1	348	43.3
Rectal ulcer	0	0	2	0.2
Ulcerative colitis	42	3.9	10	1.2
Ulcerative colitis + polyp	2	0.2	0	0
Normal	482	44.7	352	43.8
TOTAL	1078	100	804	100

Discussion

Most current international guidelines recommend the onset age of colonoscopy screening as 50 years of age in people with moderate risk. This is based on an increase of CRC incidence around 50 years of age. In 2009, the diagnosis of CRC was established in people aged 50 years and over by 90% [11]. In a study by Chen et al., one colonoscopy screening in an unscreened 50-65-year-old population was expected to prevent mortality from CRC by 49% [12]. In the Canadian Task Force on Preventive Health Care (CTFPEC) guidelines (Canada), colonoscopy screening onset age is recommended as 50 years, allowing postponing of screening until 60 years of age [13].

In 2018, US Preventive Services Task Force (USPSTF) updated the onset age of colonoscopy screening as 45 years in patients with moderate risk (available at: https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/colorectal-cancer-screening). In Saudi Arabia, the onset age of colonoscopy screening is recommended as 45 years, because the diagnosis of CRC is made in 55 years of age in Saudi women and 60 years of age in Saudi men [14]. Studies in the literature have reported that the incidence of CRC is increasing in parallel with the increasing incidences of a sedentary lifestyle, obesity, and diabetes mellitus in young adults [10].

Studies from various countries have reported the incidence of CRC in people aged under 40 years. The incidence of CRC under 40 years of age was reported as 52% in a study from Pakistan [15], 39% in a study from India [16], and 22% in a study from Korea [17]. In a study from Turkey, the incidence of early-onset CRC was reported as 20% in people aged under 40 years [18]. On the other hand, the incidence of CRC under 50 years of age was reported as 10% in a study from the USA [19], while this rate was reported as 5% in a study from the UK [20]. It is seen that the incidence of CRC in young adults is higher in developing countries compared to developed countries. We attribute this to the fact that colonoscopy screening programs are more common in developed countries.

The European Society of Gastrointestinal Endoscopy (ESGE) recommends to evaluate bowel cleanness during colonoscopy,

and appropriate or good cleanliness should be reported in at least 90% of screenings [21]. In our study, bowel cleanliness, which is among the factors affecting the quality of colonoscopy, was near 100% in all patients.

In a recent study, it was reported that at least 1 polyp was detected in 34.3% of patients undergoing colonoscopy screening [22]. Similarly, in our study, we found at least 1 polyp in 36.9% of patients undergoing colonoscopy.

In our study, the most common indications of colonoscopy in patients aged <45 years were abdominal pain in 43%, changed bowel habits in 21%, rectal bleeding in 20%, and anemia in 10%. In a study by Mikaeel et al. on colorectal cancer in young adults, indications for colonoscopy in patients aged under 50 years were found as rectal bleeding in 51%, abdominal pain in 16%, anemia in 16%, and changes in bowel habits in 13% [23]. We believe that although the indications in our study were similar to those of the mentioned study, the differences between the rates might have resulted from different sociocultural characteristics and lifestyles between the countries.

Based on the updated recommendations in recent guidelines for performing colonoscopy at an earlier age, we divided our patients into two groups as ≥45 years old and <45 years old, and evaluated the data again between these two groups. The presence of polyps and neoplastic polyps was statistically significantly higher in the ≥45- year-old group compared to the <45- year-old group. However, colonoscopy was performed in 1078 patients in the <45 -year-old group (52.3%), and pathologic findings were detected in 55.3% of these patients. In a study by Peñaloza et al. in 2017, a total of 411 colonoscopies were analyzed, and pathologic findings were observed in 44% of cases. The highest rate of pathologic findings was found in the 41-50-year-old age group [24].

In our study, the most common localization of pathologic findings was the rectum (19.6%), followed by the sigmoid colon (11.5%). In a study by Peñaloza et al., the most common localization was in the sigmoid colon as well [24]. Given that serrated adenomas are more common on the right side, the rate of pathologic findings detected in the sigmoid colon was remarkable. Also, recent studies have shown that hyperplastic polyps on the right side of the intestines may have malignant potential and should be closely followed up [4]. In our study, more than 5% of the hyperplastic polyps were localized in the cecum, ascending colon, and transverse colon on the right side. Overall, no statistically significant difference was found between patients with and without alarm symptoms (weight loss, anemia, etc.). This indicates that performing colonoscopy screening only in patients with alarm symptoms brought the possibility of missing polyps in other patient groups. Therefore, we think that colonoscopy screening should be performed not only in patients with alarm symptoms, but in all patients presenting with lower gastrointestinal complaints.

In our study, there was a significant difference between the numbers of polyps detected by the three examiners. Accordingly, the first examiner found a higher number of polyps than the other examiners. We believe this was the result of longer colonoscopy durations.

The ROC analysis was performed to determine the cut-off value for the age at risk for a high number of polyps. As a result of this analysis, a cut-off value of 29.5 years was found to create a risk for a high number of polyps with a sensitivity of 98.6% and a specificity of 91.4%. We think that this result suggests the importance of colonoscopy screening at an earlier age.

Limitations of the Study

This study has some limitations. It has a retrospective design and was conducted in a single center. Longer term results could not be obtained. On the other hand, as a strength, it claims a younger age as a threshold value for colonoscopy screening. However, our results need to be supported by further comprehensive studies.

Conclusions

Given the increasing incidence of early-onset CRC worldwide, colonoscopy screening should be performed in young adults without alarm symptoms who present with lower gastrointestinal complaints. Current guidelines recommend the age of starting colonoscopy screening as 50 years. However, as seen in our study, polyps can be found at an earlier age. Therefore, based on our findings, we believe that colonoscopy screening should be started at 45 years of age, given the increasing incidence of early-onset colorectal cancer. In order to update current guidelines and to set an earlier age for colonoscopy screening for polyps, sufficient evidence should be accumulated in the literature on this subject. We believe that our paper will contribute to further comprehensive research on the matter.

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How to cite this article:
Muhammet Fatih Aydin, Mehmet Akif Aydin. Colonoscopy screening for colon polyps: Can it be useful at an earlier age for preventing malignant transformation? Ann Clin Anal Med 2021;12(7):788-793